Objectives: Provide potential planetary science investigators, engineers, and managers an opportunity to experience the process of developing a mission concept into a proposable mission by interacting with and being taught by leading professional planetary scientists, managers, and engineers.

Approach: Organize and host at Caltech and JPL an annual intensive one-week summer school for new planetary scientists and engineers (post-docs and PhD students). Students participate in a team exercise with Team X to understand the tradeoffs necessary when developing a mission concept. Technical presentations are given by leading experts in planetary exploration, including project managers, principal investigators, and technical staff. At the end of the week the student teams present oral proposals to a review board consisting of NASA and/or JPL managers.

"A Bootcamp for Future Planetary PIs"

--Dr. Jim Head, Brown U.

- Began in 1989
  - First 10 years were lecture format (current science)
  - Last several years have been team exercises in JPL Project Design Center with oral proposals presented and evaluated
- Advisory panel includes Dr. Jim Head (Brown U) and Dr. Ron Greeley (U. Arizona), Dr. Fuk Li (JPL) and Dr. Bob Gershman (JPL)
- Students:
  - 18 per session (44 applicants in 2003)
  - Solicited electronically via Code S Research Opportunities listserv, DPS listserv, professors in planetary science, minority organizations
  - About 2:3 grad students: post docs, 1:4 male:female

Team X Lectures

1989 Planetary Systems Formation: The Study of Giant Planets
1990 Terrestrial Planets
1991 Earth and Venus Planetary Encounters: A Tale of Two Planets
1992 The Search for Other Worlds
1993 Near-Earth Objects
1994 Planetary Satellites
1995 The Making of a Planetary Flight Project
1996 Instrumentation in Planetary Exploration
1997 In-Situ Exploration and Sample Return
1998 Mars Exploration and the Search for Life
1999 The Making of a Planetary Flight Project: The Discovery Missions
2000 Discovery MicroMissions: Focused, Low-Cost Science
2001 Mission Design for Planetary Scientists: Micro/Nano Probes
2002 Mission Design for Planetary Scientists: Mars Scouts
2003 Mission Design for Planetary Scientists: Mars Scout Lander

"Bootcamps"

- *Objective*: Prepare the next generation of planetary scientists and engineers to design future missions of exploration

"Students should get a crash course in what has taken me a career to learn about missions."
--Prof. Jim Head, Brown U.

•*Approach*: Conduct 1-week intensive, hands-on team exercise in mission design using the Project Design Center.

Bell Schedule for Planetary Science Summer School 2002

Elements:

- Lectures: Background and big picture;
- Team exercise in Project Design Center
- Mission Lifecycle Tour
- Lessons learned from leading scientists
- Student presentations (proposal) to review board

Sun. Aug 4	Mon. Aug. 5	Tues. Aug. 6	Wed. Aug. 7	Thur. Aug. 8	Fri. Aug. 9
	7:45 - 8:15 Check-in at JPL Visitor Control (249) **8:15-9:15 Welcome** by Anita Sohus and Dr. Moustafa Chahine, former JPL Chief Scientist (264-439)				
	9:15- 10 National Planetary Exploration Goals, Priorities and International Cooperation: How the Process Works. The Solar System Exploration Roadmap . Fuk Li/JPL (264-439) **10-10:15** Q&A **10:15**	**8 -8:30** Check In & Badging at JPL (Bring Photo ID; passport and green card) **9:00 - 12:00 Bldg 301 Rm. 168** Project Design Center (Team X)	**8 -8:30** Check In & Badging at JPL (Bring Photo ID; passport and green card) **9:00 - 12:00 Bldg 301 Rm. 168** Project Design Center (Team X)	**8 -8:30** Check In & Badging at JPL (Bring Photo ID; passport and green card) **9:00 - 12:00 Bldg 301 Rm. 168** Project Design Center (Team X)	**8 -8:30** Check In & Badging at JPL (Bring Photo ID; passport and green card) **9-12:00** Team X and Preparation
	10:30-11:15 Remote Sensing Instrumentation , G. Ed Danielson Jr./JPL (264-439) **11:15-11:30** Q&A **11:30-12:15 In Situ Instrumentation** , Greg Bearman/JPL (264-439) **12:15-12:30** Q&A **12:**				Dry Run
		12:00 - 12:45 Lunch **303 Café** **12:45** ***Group Photo on steps of Bldg 302***	12:00 - 1:00 Lunch **190 Café**	12:00 - 1:00 Lunch **167 Tent** w/Don Burnett/Caltech (GENESIS PI)	12:00 - 1:00 Lunch **167 Tent**
	1:00 - 2:00 Introduction to the Project Design Center (PDC), Bob Oberto/JPL	**Mission Lifecycle Tour: I: Development** **1:00 - 1:25 Bldg 302** **MicroDevices Lab** , Mike Hecht/JPL **1:30 - 2:00 Bldg 317** **In-Situ Instruments Lab** , Jennifer H Tro	**Mission Lifecycle Tour: II: Assembly and Test** **1:00 - 1:25 Bldg 170** **Fabrication Shops** , Sharon Langenbeck/JPL **1:30 - 2:00 Bldg 179** **Spac**	**Mission Lifecycle Tour: III: Operations and Data Analysis** **1:00 - 1:30 Bldg 230** Spacecraft Operations Facility, Eilene Theilig/JPL **1:30 - 1:45 Walk to Bldg 169**	1-2 Presentation to review board 2:00 - 2:30 Break 2:30 - 3:30 Board Comments Q & A 3:30 - 4:00 Wrap Up Certificates 4:00 Adjourn
		3 - 5 p.m. Work time in PDC	**3:00 - 4:00 Balloons,** Jiunn Wu (157-102) **4:00 - 5:00 Andy Ingersoll/Caltech (** 180-101) The History of Space Exploration and the lessons learned along the way!	**3:00 - 4:00 PI speaker Peter Tsou/JPL** (233-201A) 4-6 p.m. Work time (233-201A)	
5:30 - 8 p.m Early Registration near the bar at Courtyard by Marriott, Pasadena	**6-8 p.m.** Pizza Party at Domenico's	Dinner on Own Work on Proposal	Dinner on Own Work on Proposal	**6-9 p.m. SSE Dinner In von Karman** Work on Proposal	

• Leading professors across the country recommend their students

• Previous attendees are now sending their own students

• Students are expected to report and apply what they learned to their home research groups

• Networking with peers and experienced folks is an important aspect

• 2001 team presented a paper on their proposal at 2002 World Space Congress (lead author Geoff Landis of NASA/Glenn)

• 2000 attendee Pierre Moreels (JPL post-doc) made news (March 2001) when he analyzed polygonal cracks on Venus

• " *This was a uniquely valuable experience . . . The most useful continuing education experience I have ever had."*

• *"I would absolutely recommend it, especially to planetary science students who do not have experience working with the engineering or planning side of a mission."*

• *"I have never wanted to be an engineer so bad in my life . . . But there's always that science chair." (from a Ph.D. scientist)*

• *"At university, its all about what you the individual can do. I'm a smart person, but I learned that it takes a lot of smart people working together [to design/conduct a mission].*

NASA Planetary Science Summer School 2003

NASA Planetary Science Summer School 2003